

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claim 1. (Currently Amended) A process for partially oxidizing acrolein to acrylic acid in the gas phase under heterogeneous catalysis, comprising:

passing a starting gas mixture which comprises acrolein, molecular oxygen and at least one inert gas containing at least 20 % by volume of molecular nitrogen and contains molecular oxygen and the acrolein in a molar $O_2:C_3H_4O$ ratio of ≥ 0.5 through one reaction stage over a fixed catalyst bed which is arranged in two spatially successive reaction zones A,B, the temperature of reaction zone A being a temperature in the range from 230 to 320° C and the temperature of reaction zone B likewise being a temperature in the range from 230 to 320° C, whose active composition in each reaction zone is at least one multimetal oxide comprising the elements Mo and V, in such a way that reaction zone A extends to an acrolein conversion of ranging from 45 to 85 mol % and, on single pass of the starting gas mixture through the fixed catalyst bed, the acrolein conversion is ≥ 90 mol % and the selectivity to acrylic acid, based on acrolein converted, is ≥ 90 mol %, the chronological sequence in which the starting gas mixture flows through the reaction zones corresponding to the alphabetic sequence of the reaction zones, wherein

a) the hourly space velocity of the acrolein contained in the starting gas mixture ~~on~~ over the fixed catalyst bed is ≤ 145 l (STP) of acrolein/l of fixed catalyst bed·h and ≥ 70 l (STP) of acrolein/l of fixed catalyst bed·h,

b) the volume-specific activity of the fixed catalyst bed is either constant or increases at least once in the flow direction of the reaction gas mixture over the fixed catalyst bed, and

c) the difference $T^{\max A} - T^{\max B}$, determined from the highest temperature $T^{\max A}$ which the reaction gas mixture has within the reaction zone A and the highest temperature $T^{\max B}$ which the reaction gas mixture has within reaction zone B, is $\geq 0^{\circ} \text{ C}$.

Claim 2. (Previously Presented) The process as claimed in claim 1, wherein the difference $T^{\max A} - T^{\max B}$ is $\geq 0^{\circ} \text{ C}$ and $\leq 75^{\circ} \text{ C}$.

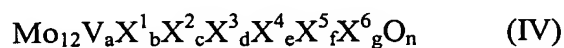
Claim 3. (Previously Presented) The process as claimed in claim 1, wherein the difference $T^{\max A} - T^{\max B}$ is $\geq 3^{\circ} \text{ C}$ and $\leq 60^{\circ} \text{ C}$.

Claim 4. (Previously Presented) The process as claimed in claim 1, wherein the difference $T^{\max A} - T^{\max B}$ is $\geq 5^{\circ} \text{ C}$ and $\leq 40^{\circ} \text{ C}$.

Claim 5. (Previously Presented) The process as claimed in claim 1, wherein the hourly space velocity of the acrolein contained in the starting gas mixture over the fixed catalyst bed is $\geq 70 \text{ l (STP) of acrolein/l}\cdot\text{h}$ and $\leq 140 \text{ l (STP) of acrolein/l}\cdot\text{h}$.

Claim 6. (Previously Presented) The process as claimed in claim 1, wherein the hourly space velocity of the acrolein contained in the starting gas mixture on the fixed catalyst bed is $\geq 80 \text{ l (STP) of acrolein/l}\cdot\text{h}$ and $\leq 130 \text{ l (STP) of acrolein/l}\cdot\text{h}$.

Claim 7. (Previously Presented) A process as claimed in claim 1, wherein the active composition of the fixed catalyst bed is at least one multimetal oxide active composition of the formula IV



where the variables are defined as follows:

X^1 = W, Nb, Ta, Cr and/or Ce,

X^2 = Cu, Ni, Co, Fe, Mn and/or Zn,

X^3 = Sb and/or Bi,

X^4 = one or more alkali metals,

X^5 = one or more alkaline earth metals,

X^6 = Si, Al, Ti and/or Zr,

a = from 1 to 6,

b = from 0.2 to 4,

c = from 0.5 to 18,

d = from 0 to 40,

e = from 0 to 2,

f = from 0 to 4,

g = from 0 to 40, and

n = a number which is determined by the valency and frequency of the elements other than oxygen in IV.

Claim 8. (Previously Presented) The process as claimed in claim 1, wherein the volume-specific activity of the fixed catalyst bed increases at least once in the flow direction of the reaction gas mixture over the fixed catalyst bed.

Claim 9. (Previously Presented) The process as claimed in claim 1, wherein the difference between the temperature of the reaction zone B (T_B) and the temperature of the reaction zone A (T_A) is $\leq 0^\circ \text{ C}$ to $\geq -10^\circ \text{ C}$.

Claim 10. (Previously Presented) The process as claimed in claim 9, wherein the difference between the temperature of the reaction zone B (T_B) and the temperature of the reaction zone A (T_A) is $\leq 0^\circ \text{ C}$ to $\geq -5^\circ \text{ C}$.

Claim 11. (Previously Presented) The process as claimed in claim 10, wherein the difference between the temperature of the reaction zone B (T_B) and the temperature of the reaction zone A (T_A) is $\leq 0^\circ \text{ C}$ to $\geq -3^\circ \text{ C}$.

Claim 12. (Previously Presented) The process as claimed in claim 10, wherein the pressure within the reaction zones ranges from 1 to 5 bar.

Claim 13. (Previously Presented) The process as claimed in claim 10, wherein the conversion of acrolein in reaction zone A ranges from 50 to 85 mol %.

Claim 14. (Previously Presented) The process as claimed in claim 10, wherein the conversion of acrolein in reaction zone A ranges from 60 to 85 mol %.